

# Postseismic Deformation Seven Years After the 1999 Chi-Chi, Taiwan, Earthquake

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## Abstract

The 1999 Chi-Chi earthquake ( $M_w$  7.6) is a large inland low-angle thrusting event. Inversions of geodetic and seismic data show a maximum co-seismic slip of about 10-15 m concentrated at the northern bend of the seismogenic fault, and extending about 10 km down-dip from the ground surface. Significant transient postseismic deformation was observed by frequent GPS campaign surveys in central Taiwan and a new densely-deployed continuous GPS array in Taiwan installed after the Chi-Chi earthquake. The first 15-month postseismic GPS data reveal the postseismic displacement field resembles that due to the main shock, with maximum displacements of 25 and 23 cm in the horizontal and vertical components. Afterslip is the dominant mechanism in the first 15-month period after the main shock. Based on these data, Hsu et al. (2007) inverted for the space-time distribution of afterslip, using the Extended Network Inversion Filter. The results indicate high slip rates surrounding the region of greatest coseismic slip. The slip-rate distribution remains roughly stationary over the 15-month period. Maximum afterslip of 0.57 m occurs down-dip and to the east of the hypocentral region. Afterslip at hypocentral depths is limited to the southern part of the main shock rupture, with little or no slip on the northern section where coseismic slip was greatest. A major part of the postseismic deformation is aseismic. In this study, velocity field from 2001 to 2003 and 2004 to 2006 are estimated, respectively, from both the campaign-surveyed and continuous GPS data in central Taiwan. The patterns of postseismic displacement fields during those two periods will be compared with that in the first 15-month period. These GPS data will also be utilized to study if afterslip is still the dominant mechanism of postseismic deformation seven years after the Chi-Chi earthquake, or the viscoelastic relaxation of the lower crust and upper mantle has become more prominent.